

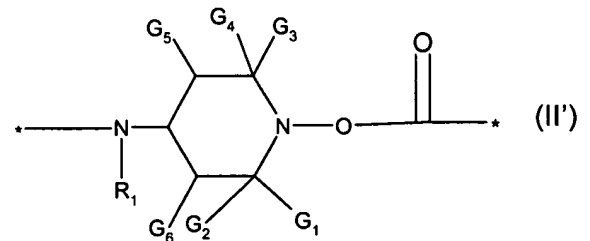
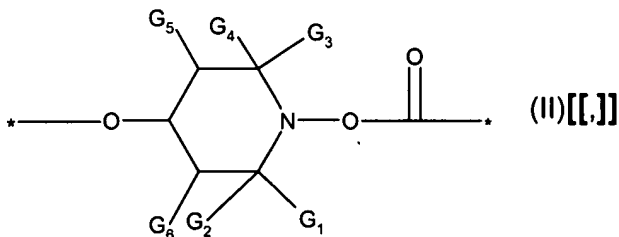
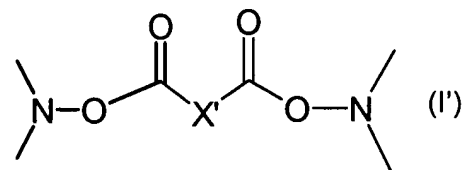
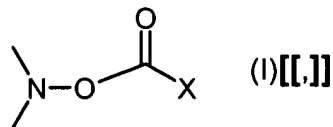
In the Claims

1. (currently amended) A flame retardant composition which comprises

(a) a thermoplastic polymeric substrate [(I)] and

(b) a mixture of

(i) a hydroxylamine ester having a structural element of formula (I) or formula (I') or a polymeric hydroxylamine ester having a repetitive structural unit of formula (II) or (II')



wherein

X is hydrogen, C₁-C₃₆alkyl, C₂-C₃₆alkenyl, C₂-C₁₈alkinyl, C₆-C₁₀aryl, -O-C₁-C₁₈alkyl, -O-C₆-C₁₀aryl, -NH-C₁-C₁₈alkyl, -NH-C₆-C₁₀aryl, -N(C₁-C₆alkyl)₂ ;

X' is a direct bond or C₁-C₃₆alkylene, C₂-C₃₆alkenylene, C₂-C₃₆alkinylene, -(C₁-C₆alkylene)-phenylene-(C₁-C₆alkylene)- or a group from a dimer acid;

G₁, G₂, G₃ and G₄ are independently alkyl of 1 to 4 carbon atoms, or G₁ and G₂ together and G₃ and G₄ together, or G₁ and G₂ together or G₃ and G₄ together are pentamethylene;

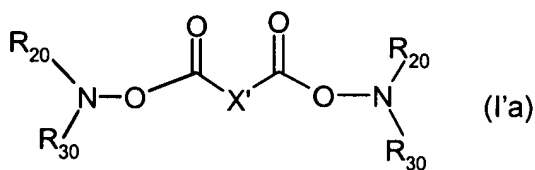
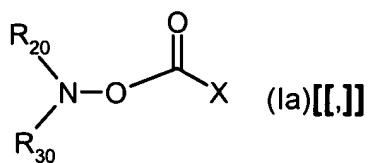
G₅ and G₆ are independently hydrogen or C₁-C₄ alkyl; and

R₁ is C₁-C₁₂alkyl, C₅-C₇cycloalkyl, C₇-C₉aralkyl, C₂-C₁₈alkanoyl, C₃-C₅alkenoyl or benzoyl;

and

(ii) a flame retardant compound selected from the group consisting of halogenated, phosphorus, boron, silicon ~~and~~ antimony compounds, metal hydroxides, metal hydrates, metal oxides and mixtures thereof.

2. (currently amended) A composition according to claim 1 wherein the hydroxylamine ester is of formula (Ia) or (I'a)



wherein

X is hydrogen, C₁-C₃₆alkyl, C₂-C₃₆alkenyl, C₂-C₁₈alkinyl, C₆-C₁₀aryl, -O-C₁-C₁₈alkyl, -O-C₆-C₁₀aryl, -NH-C₁-C₁₈alkyl, -NH-C₆-C₁₀aryl, -N(C₁-C₆alkyl)₂ ;

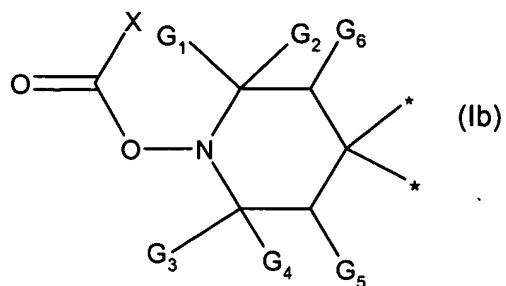
X' is a direct bond or C₁-C₃₆alkylene, C₃-C₃₆alkenylene, C₃-C₃₆alkynylene, -(C₁-C₆alkylene)-phenyl-(C₁-C₆alkylene) or a group from a dimer acid;

R₂₀ and R₃₀ independently are unsubstituted C₁-C₁₈alkyl, C₂-C₁₈alkenyl, C₂-C₁₈alkinyl or with halogen, CN, NO₂ or -COOR₄₀ substituted or with O or NR₄₀ interrupted C₁-C₁₈alkyl, C₂-C₁₈alkenyl or C₂-C₁₈alkinyl; and

R₄₀ is H, phenyl or C₁-C₁₈alkyl; or

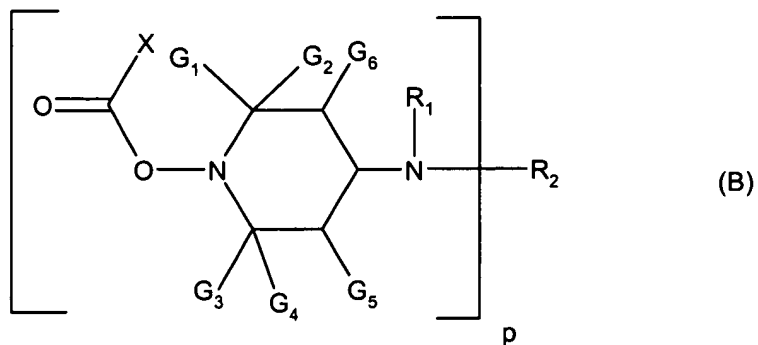
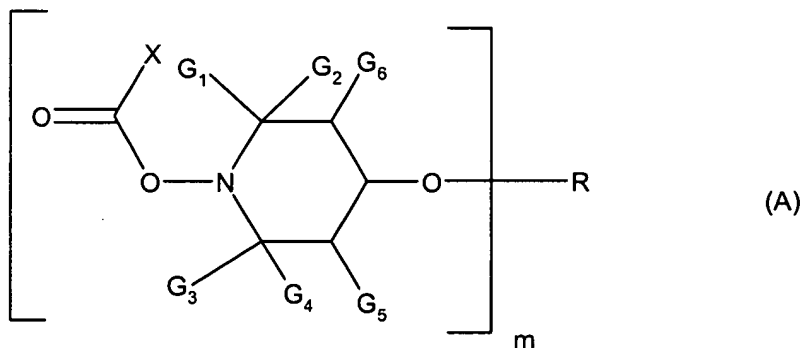
R₂₀ and R₃₀ together with the nitrogen atom to which they are bound form a 5 or 6 membered ring which may be interrupted by a nitrogen or oxygen atom and which may be substituted by one or more C₁-C₆alkyl groups, carboxyl groups, C₁-C₁₈alkoxy groups or C₁-C₁₈alkanoyloxy groups.

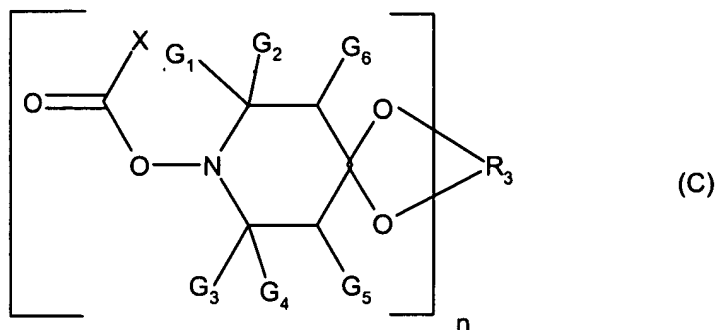
3. (original) A composition according to claim 1 wherein the structural element of formula (I) is of formula (Ib)



wherein * denotes a bond and the other substituents are as defined in claim 1.

4. (currently amended) A composition according to claim 3 wherein the hydroxylamine ester is of formula A, B or C[[.]]





wherein

G₁, G₂, G₃ and G₄ are methyl or G₁ and G₃ are methyl and G₂ and G₄ are ethyl or G₁ and G₂ are methyl and G₃ and G₄ are ethyl;

G₅ and G₆ are independently hydrogen or methyl;

m is 1;

R is hydrogen, C₁-C₁₈alkyl which is uninterrupted or C₂-C₁₈alkyl which is interrupted by one or more oxygen atoms, cyanoethyl, benzoyl, glycidyl, a monovalent radical of an aliphatic carboxylic acid having 2 to 18 carbon atoms, of a cycloaliphatic carboxylic acid having 7 to 15 carbon atoms, or an α,β-unsaturated carboxylic acid having 3 to 5 carbon atoms or of an aromatic carboxylic acid having 7 to 15 carbon atoms, where each carboxylic acid can be substituted in the aliphatic, cycloaliphatic or aromatic moiety by 1 to 3 -COOZ₁₂ groups, in which Z₁₂ is H, C₁-C₂₀alkyl, C₃-C₁₂alkenyl, C₅-C₇cycloalkyl, phenyl or benzyl; or

R is a monovalent radical of a carbamic acid or phosphorus-containing acid or a monovalent silyl radical;

p is 1;

R₁ is C₁-C₁₂alkyl, C₅-C₇cycloalkyl, C₇-C₈aralkyl, C₂-C₁₈alkanoyl, C₃-C₅alkenoyl or benzoyl;

R₂ is C₁-C₁₈alkyl, C₅-C₇cycloalkyl, C₂-C₈alkenyl unsubstituted or substituted by a cyano, carbonyl or carbamide group, or is glycidyl, a group of the formula -CH₂CH(OH)-Z or of the formula -CO-Z- or -CONH-Z wherein Z is hydrogen, methyl or phenyl;

n is 1,

R₃ is C₂-C₈alkylene or hydroxyalkylene or C₄-C₃₆acyloxyalkylene

and

X is hydrogen, C₁-C₃₆alkyl or C₆-C₁₀aryl.

5. (currently amended) A composition according to claim 4 wherein the hydroxylamine ester is of formula A or C;

G₁, G₂, G₃ and G₄ are methyl or G₁ and G₃ are methyl and G₂ and G₄ are ethyl;

G₅ and G₆ are independently hydrogen or methyl;

m is 1;

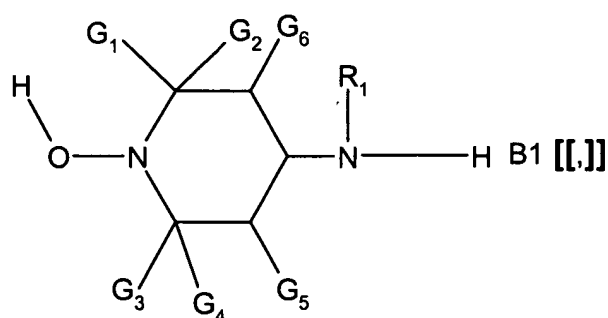
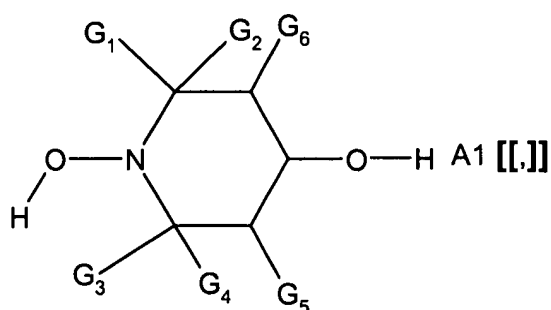
R is hydrogen, C₁-C₁₈alkyl, a monovalent radical of an aliphatic carboxylic acid having 2 to 18 carbon atoms, of a cycloaliphatic carboxylic acid having 7 to 15 carbon atoms, or an α,β -unsaturated carboxylic acid having 3 to 5 carbon atoms or of an aromatic carboxylic acid having 7 to 15 carbon atoms;

n is 1;

R₃ is C₂-C₈alkylene or hydroxyalkylene or C₄-C₃₆acyloxyalkylene and

X is hydrogen, C₁-C₃₆alkyl or C₆-C₁₀aryl.

6. (currently amended) A composition according to claim 1 wherein the hydroxylamineester is an oligomer or polymer obtained ~~able~~ by reacting a dicarboxylic acid or a dicarboxylic acid derivative with a compound of formula A1 or B1 or by reacting a diisocyanate with a compound of formula A1



wherein the substituents G₁, G₂, G₃, G₄, G₅, G₆ and R₁ are as defined in claim 1[[6]].

7. (original) A composition according to claim 1 wherein the hydroxylamine ester is present in an amount of from 0.1 to 15 weight-% based on the weight of the polymer;

8. (currently amended) A composition according to claim 1 wherein the polymer substrate is a resin selected from the group of ~~resins~~ consisting of the polyolefins, the thermoplastic olefins ~~[[,]]~~ and styrenic polymers and copolymers.

9. (currently amended) A composition according to claim 8 wherein the polymer substrate is polypropylene, polyethylene, thermoplastic olefin (TPO), polystyrene, ABS, high impact polystyrene, expandable polystyrene (EPS) and ~~extrusion~~ foamed polystyrene.

10. (currently amended) A composition according to claim 1 wherein the flame retardant compound ~~component~~ (ii) is selected from the group consisting of

tetraphenyl resorcinol diphosphite, ~~(FYROLFLEX® RDP)~~
chloroalkyl phosphate esters, ~~(ANTIBLAZE® AB-100 or FYROL® FR-2)~~
polybrominated diphenyl oxide, ~~(DE-60F)~~
decabromodiphenyl oxide ~~(DBDOP)~~,
antimony trioxide (Sb_2O_3),
antimony pentoxide (Sb_2O_5),
tris[3-bromo-2,2-(bromomethyl)propyl] phosphate ~~(PB-370®)~~,
triphenyl phosphate,
bis(2,3-dibromopropyl ether) of bisphenol A ~~(PE68)~~,
ammonium polyphosphate (APP) ~~or (HOSTAFLAM® AP750)~~,
resorcinol diphosphate oligomer (RDP),
brominated epoxy resin,
tetrabromobisphenol A-bis-(allyl ether),
hexabromocyclododecane,
dibromocyclohexane,
tribromophenol-cyanurate, ~~(Dead Sea® FR-245)~~
ethylene-bis(tetrabromophthalimide) ~~(BT93)~~,
bis(hexachlorocyclopentadieno)cyclooctane ~~(DECLORANE PLUS®)~~,
calcium sulfate,

chlorinated paraffins,
 magnesium carbonate,
 melamine phosphates,
 melamine pyrophosphates,
 molybdenum trioxide,
 zinc oxide,
 1,2-bis(tribromophenoxy)ethane (~~FF680~~),
 tetrabromo-bisphenol A (~~SAYTEX® RB100~~),
 Saytex® BC-56HS, (~~Albemarle~~)
 magnesium hydroxide,
 alumina trihydrate,
 zinc borate, ~~and~~
 ethylenediamine diphosphate (EDAP) [[.]] and
 Oligomeric diisopropyl benzene.

11. (currently amended) A composition according to claim 10 wherein the flame retardant compound ~~(ii)~~ is tris[3-bromo-2,2-(bromomethyl)propyl] phosphate (~~PB370~~), hexabromo-cyclododecane, tetrabromobisphenol A-bis-(allyl ether), dibromocyclohexane or ~~and~~ Saytex BC-56HS (~~Albemarle~~).

12. (currently amended) A composition according to claim 1 wherein the flame retardant compound ~~component (ii)~~ is present in an amount of from 0.1 to 30 weight-% based on the weight of the polymer.

13. (original) A composition according to claim 1 wherein the ratio by weight between component (i) and (ii) is from 10:1 to 1:100.

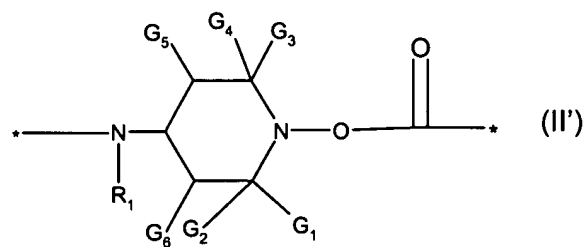
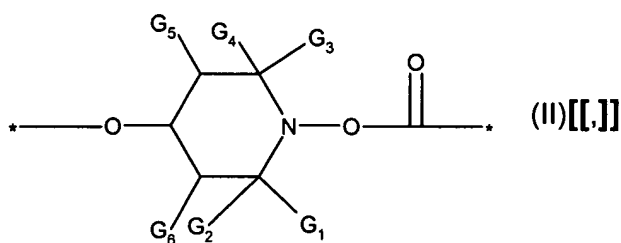
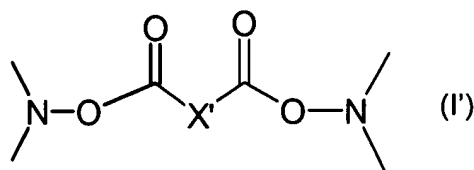
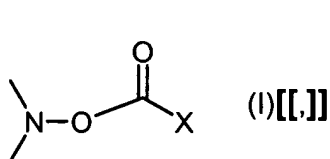
14. (original) A composition according to claim 1, which additionally contains an organic peroxide and/or another radical generator.

15. (original) A composition according to claim 1 which additionally contains a further additive selected from the group consisting of a UV absorber, a sterically hindered amine, a phenolic antioxidant, a phosphite or phosphonite and a benzofuranone or an indolinone.

16. (currently amended) A method of making a thermoplastic polymer flame retarding by incorporating into the thermoplastic polymer

a mixture of

- (i) a hydroxylamine ester having a structural element of formula (I) or formula (I') or ~~with~~ a polymeric hydroxylamine ester having a repetitive structural unit of formula (II) or (II')



wherein

X is hydrogen, C₁-C₃₆alkyl, C₂-C₃₆alkenyl, C₂-C₁₈alkinyl, C₆-C₁₀aryl, -O-C₁-C₁₈alkyl, -O-C₆-C₁₀aryl, -NH-C₁-C₁₈alkyl, -NH-C₆-C₁₀aryl, -N(C₁-C₆alkyl)₂ ;

X' is a direct bond or C₁-C₃₆alkylene, C₂-C₃₆alkenylene, C₂-C₃₆alkynylene, -(C₁-C₆alkylene)-phenylene-(C₁-C₆alkylene)- or a group from a dimer acid;

G₁, G₂, G₃ and G₄ are independently alkyl of 1 to 4 carbon atoms, or G₁ and G₂ together and G₃ and G₄ together, or G₁ and G₂ together or G₃ and G₄ together are pentamethylene;

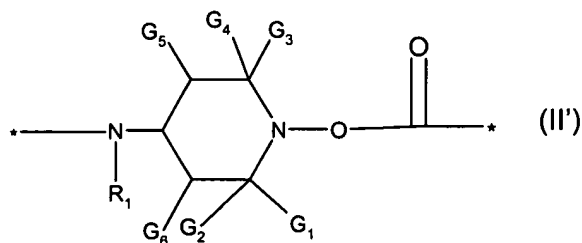
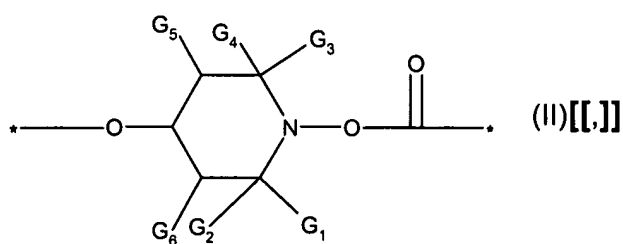
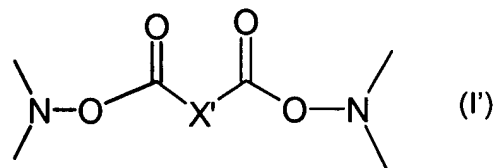
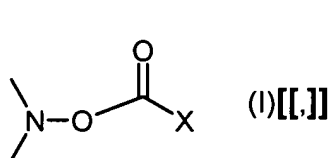
G₅ and G₆ are independently hydrogen or C₁-C₄ alkyl; and

R₁ is C₁-C₁₂alkyl, C₅-C₇cycloalkyl, C₇-C₈aralkyl, C₂-C₁₈alkanoyl, C₃-C₅alkenoyl or benzoyl; and

(ii) a flame retardant compound selected from the group consisting of halogenated, phosphorus, boron, silicon and antimony compounds, metal hydroxides, metal hydrates, metal oxides and mixtures thereof.

17. (currently amended) A [[F]] flame retardant mixture comprising

- (i) a hydroxylamine ester having a structural element of formula (I) or formula (I') or with a polymeric hydroxylamine ester having a repetitive structural unit of formula (II) or (II')
- (ii)



wherein

X is hydrogen, C₁-C₃₆alkyl, C₂-C₃₆alkenyl, C₂-C₁₈alkinyl, C₆-C₁₀aryl, -O-C₁-C₁₈alkyl, -O-C₆-C₁₀aryl, -NH-C₁-C₁₈alkyl, -NH-C₆-C₁₀aryl, -N(C₁-C₆alkyl)₂ ;

X' is a direct bond or C₁-C₃₆alkylene, C₂-C₃₆alkenylene, C₂-C₃₆alkinylene, -(C₁-C₆alkylene)-phenylene-(C₁-C₆alkylene) or a group from a dimer acid;

G₁, G₂, G₃ and G₄ are independently alkyl of 1 to 4 carbon atoms, or G₁ and G₂ together and G₃ and G₄ together, or G₁ and G₂ together or G₃ and G₄ together are pentamethylene;
G₅ and G₆ are independently hydrogen or C₁-C₄ alkyl; and
R₁ is C₁-C₁₂alkyl, C₅-C₇cycloalkyl, C₇-C₈aralkyl, C₂-C₁₈alkanoyl, C₃-C₅alkenoyl or benzoyl; and

(ii) a flame retardant compound selected from the group consisting of halogenated, phosphorus, boron, silicon ~~or~~ and antimony compounds, metal hydroxides, metal hydrates, metal oxides and mixtures thereof.

18. (canceled)

19. (canceled)